CRUISE REPORT

Southeast Fishery-Independent Survey (SEFIS)

NOAA Ship *Pisces* Cruise PC-11-02
17 – 28 May 2011
Total Number of Days At-Sea - 12

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Beaufort Laboratory
101 Pivers Island Rd.
Beaufort, NC 28516

130 camera-trap deployments
22 CTD casts
22 areas mapped

INTRODUCTION

The NOAA Ship *Pisces* departed Mayport Naval Station, FL, on 17 May 2011 at 1530 for the Southeast Fishery-Independent Survey (SEFIS) sampling in continental shelf and shelf-break waters off the southeastern US. SEFIS was created by the National Marine Fisheries Service in 2010 and operates out of the Beaufort Laboratory. This survey was created to conduct applied fishery-independent sampling and related research focusing on the assessment of spatial variability in distribution and abundance of red snapper and other reef species within the snapper-grouper complex, via data collected from fish traps, video cameras, and acoustics. During this survey, chevron trap catches and associated underwater video recordings were collected from known hardbottom habitats between 27.38 °N and 29.94 °N. A total of 130 stations were sampled with trap-video arrays over 12 sea days between 19 and 62 m depths.

OBJECTIVES

1. Increase the spatial footprint and sample size of fishery-independent sampling in US southeast waters. Baited chevron traps, with one or more mounted high-definition video cameras, were utilized for (a) hardbottom reef fish community assessments, (b) collection of reef fish for biological samples (i.e., otoliths and gonads), and (c) comparative gear sampling (cameras versus traps versus split-beam sonar).

2. Use video cameras on chevron traps to address trap selectivity issues, locate and describe hardbottom habitats, and provide an additional index of abundance for stock assessments.

3. Use a CTD instrument package to collect environmental data (temperature, salinity, dissolved oxygen) at camera-trap sampling locations.

4. Map bottom habitats using multibeam sonar to improve survey design and to expand knowledge of hardbottom habitats in the southeast US.

5. Use fisheries acoustic gear (split-beam sonar) to assess its use as a fishery-independent survey tool.

METHODS

Camera-Trap Sampling

Camera-trap gear consisted of two high definition video cameras mounted to a chevron fish trap. Chevron traps were composed of plastic-coated wire mesh. A Canon camera (model HF S200) was attached above the mouth of the trap, and a GoPro camera (model HD Hero®) was attached above the nose of the trap (Figure 1). Traps were baited with Atlantic menhaden, *Brevoortia tyrannus*, and video cameras were set to record before deployment. Camera-traps were deployed at least 200 meters apart on suspected or known hardbottom habitats, and left to soak for approximately 90 minutes. Camera-traps were most often deployed in sets of six. A CTD cast (see environmental data collection) was conducted during the 90-minute soak time for each trap set. Fish catches were processed after trap retrieval. All fish were enumerated, weighed, and measured to the nearest millimeter. Individuals of select species (mostly species found in the snapper-grouper complex) were further processed for additional lengths and biological samples (otoliths, gonads, and DNA). Video files were downloaded and backed up on media storage devices. Biological samples and video files were brought to the Beaufort laboratory for further processing and analysis.

Environmental Data Collection
Environmental data were collected with Seabird "Conductivity, Temperature, and Depth" instrument package (CTD; model SBE 9) and Scientific Computer System (SCS) software. CTD casts were conducted near the middle of the camera-trap soak period; instruments were lowered to within 2 meters of the bottom. Numerous water profile measurements were taken, including temperature (◦C), salinity, and dissolved oxygen (mg/L). CTD data were archived for further processing at the Beaufort laboratory. SCS software (version 4.0) was used to collected specific information for each fishing and CTD event, including soak time/cast duration as well as start and end latitude, longitude and depth (m).

Acoustic Data Collection
Multibeam acoustic data collection: The Pisces ME70 multibeam unit was typically used to map benthic habitats during nighttime hours. Areas for mapping were selected based on: (1) the need for additional hardbottom sampling sites in an area; (2) predicted hardbottom habitat from Dunn & Halpin (2009); and (3) efficient use of vessel time. Raw ME70 data (*.raw) were run through MATLAB software designed by George "Randy" Cutter (NOAA, SWFSC). The software was designed to extract bathymetry data (text files in the *.xyz format) which were readable via Fledermaus 3D visualization software (v7). The goal was to create a 3D bathymetric surface in Fledermaus and use "Geo-picking" to select trap site coordinates on unsampled hardbottom habitat. Trap site coordinates were exported to ArcGIS (v9) and navigation software for additional planning.

Split-beam acoustic data collection: Four Pisces EK60 echosounders (18, 38, 120, 200 kHz), were used to collect water column information, as well as document bottom features indicative of hardbottom habitat. Interesting bottom features were logged using ER60 acquisition software, and GPS coordinates were extracted by mousing over specific features of the ocean bottom or by processing EK60 files (*.raw) within Echoview software (v4.90).

SURVEY RESULTS

Camera-Trap Sampling
130 stations were sampled with camera-trap gear (Table 1, Figure 2). From these traps, 16 taxa were collected and worked up for length frequency data.

Environmental Data Collection
22 CTD casts were conducted during the cruise (Table 1, Figure 2). CTD data will be processed with Seabird SBE Data Processing software (version 7.2), and archived in a database at the NMFS-Beaufort Laboratory for future analysis.

Acoustic Data Collection
Multibeam:
22 areas were mapped using multibeam acoustic gear (Figure 3). Multibeam data will be processed using MATLAB and Fledermaus, and archived in an ArcGIS project for future analysis and survey planning. Multibeam maps were useful in selecting trap/video sampling sites, i.e., identifying hardbottom habitats. All multibeam acoustic data were archived on a server at the NMFS-Beaufort Laboratory for future analysis.

Split-beam:
The EK60 echosounders recorded water column information during all multibeam mapping efforts. GPS points extracted from EK60 data were often used in conjunction with the ME70 to determine probable trap/video sampling sites for the following day. All EK60 acoustic data were archived on a server at the NMFS, Beaufort Laboratory for future analysis.

Table 1. Summary of station coordinates, depth, date and time for each fishing event (camera-trap, Gear=324) and CTD cast (Gear=298) conducted on the PC-11-02 survey. Times were recorded in Coordinated Universal Time (UTC).

Collection Number	Gear	Date	Time (UTC)	Latitude	Longitude	Depth (m)
113001	324	05/19/2011	12:42:50	27.40	-80.06	29
113002	324	05/19/2011	12:48:23	27.40	-80.05	30
113003	324	05/19/2011	12:58:32	27.39	-80.05	30
113004	324	05/19/2011	13:06:25	27.39	-80.06	31
113005	324	05/19/2011	13:10:11	27.38	-80.06	31
113006	324	05/19/2011	13:17:00	27.38	-80.06	28
113007	298	05/19/2011	13:40:02	27.40	-80.06	28
113008	324	05/19/2011	16:33:55	27.46	-80.07	25
113009	324	05/19/2011	16:51:27	27.45	-80.07	26
113010	324	05/19/2011	17:23:42	27.45	-80.07	27
113011	324	05/19/2011	17:38:36	27.45	-80.07	28
113012	324	05/19/2011	17:56:02	27.44	-80.07	25
113013	324	05/19/2011	18:28:29	27.44	-80.07	26
113014	298	05/19/2011	21:18:28	27.45	-80.07	26
113015	324	05/20/2011	12:13:18	27.75	-80.13	29
113016	324	05/20/2011	12:21:25	27.75	-80.14	28
113017	324	05/20/2011	12:26:33	27.75	-80.14	25
113018	324	05/20/2011	12:35:18	27.74	-80.14	27
113019	324	05/20/2011	12:45:34	27.74	-80.13	28
113020	324	05/20/2011	12:52:56	27.74	-80.13	30
113021	298	05/20/2011	13:07:55	27.75	-80.13	28
113022	324	05/20/2011	15:59:38	27.88	-80.16	29
113023	324	05/20/2011	16:15:11	27.87	-80.16	30
113024	324	05/20/2011	16:29:25	27.87	-80.15	30
113025	324	05/20/2011	16:32:39	27.87	-80.16	29
113026	324	05/20/2011	16:38:08	27.86	-80.15	28
113027	324	05/20/2011	16:45:25	27.86	-80.16	28
113028	298	05/20/2011	17:12:14	27.89	-80.16	30
113029	324	05/21/2011	11:54:53	28.89	-80.27	42
113030	324	05/21/2011	12:05:14	28.89	-80.27	42
113031	324	05/21/2011	12:15:55	28.89	-80.27	40
113032	324	05/21/2011	12:24:03	28.89	-80.28	41

Collection Number	Gear	Date	Time (UTC)	Latitude	Longitude	Depth (m)
113033	324	05/21/2011	12:34:58	28.88	-80.27	40
113034	324	05/21/2011	12:49:33	28.88	-80.27	41
113035	298	05/21/2011	13:04:34	28.90	-80.27	43
113036	324	05/21/2011	15:57:15	28.90	-80.18	54
113037	324	05/21/2011	16:07:57	28.89	-80.18	54
113038	324	05/21/2011	16:17:36	28.89	-80.18	62
113039	324	05/21/2011	16:26:16	28.89	-80.18	53
113040	324	05/21/2011	16:34:11	28.89	-80.18	54
113041	324	05/21/2011	16:44:09	28.88	-80.17	54
113042	298	05/21/2011	17:04:41	28.90	-80.18	55
113043	324	05/21/2011	19:28:41	28.88	-80.17	53
113044	324	05/21/2011	19:36:29	28.88	-80.17	58
113045	324	05/21/2011	19:43:08	28.87	-80.17	53
113046	324	05/21/2011	19:50:04	28.87	-80.17	54
113047	324	05/21/2011	19:59:15	28.86	-80.17	53
113048	324	05/21/2011	20:08:11	28.86	-80.17	58
113049	298	05/21/2011	20:30:13	28.89	-80.17	58
113050	324	05/22/2011	11:56:20	29.09	-80.59	24
113051	324	05/22/2011	12:02:37	29.10	-80.58	20
113052	324	05/22/2011	12:13:27	29.10	-80.58	23
113053	324	05/22/2011	12:19:16	29.10	-80.58	24
113054	324	05/22/2011	12:26:54	29.10	-80.58	22
113055	324	05/22/2011	12:34:33	29.10	-80.57	25
113056	298	05/22/2011	12:48:04	29.09	-80.59	24
113057	324	05/22/2011	14:46:07	29.07	-80.55	25
113058	324	05/22/2011	14:56:01	29.07	-80.54	21
113059	324	05/22/2011	15:03:05	29.07	-80.54	26
113060	324	05/22/2011	15:13:48	29.07	-80.53	22
113061	324	05/22/2011	15:18:18	29.07	-80.53	22
113062	324	05/22/2011	15:26:11	29.07	-80.53	22
113063	298	05/22/2011	15:38:57	29.07	-80.55	21
113064	324	05/22/2011	18:55:28	29.18	-80.61	26
113065	324	05/22/2011	19:04:04	29.18	-80.60	27
113066	324	05/22/2011	19:15:50	29.17	-80.60	25
113067	324	05/22/2011	19:21:34	29.17	-80.59	26
113068	324	05/22/2011	19:33:31	29.17	-80.59	25
113069	324	05/22/2011	19:38:06	29.17	-80.58	27
113070	298	05/22/2011	20:02:33	29.18	-80.61	26
113071	324	05/23/2011	15:25:01	29.14	-80.51	31
113072	324	05/23/2011	15:32:34	29.14	-80.51	29
113073	324	05/23/2011	15:39:27	29.13	-80.50	31
113074	324	05/23/2011	15:44:42	29.13	-80.50	31

Collection Number	Gear	Date	Time (UTC)	Latitude	Longitude	Depth (m)
113075	324	05/23/2011	15:49:57	29.13	-80.50	31
113076	324	05/23/2011	15:52:58	29.12	-80.50	31
113077	298	05/23/2011	16:15:39	29.14	-80.51	33
113078	324	05/23/2011	18:28:56	29.16	-80.54	29
113079	324	05/23/2011	18:36:42	29.16	-80.54	32
113080	324	05/23/2011	18:42:57	29.16	-80.55	29
113081	324	05/23/2011	18:50:16	29.16	-80.55	29
113082	324	05/23/2011	18:57:45	29.16	-80.56	30
113083	324	05/23/2011	19:02:57	29.17	-80.56	32
113084	298	05/23/2011	19:21:57	29.16	-80.54	29
113085	324	05/24/2011	11:47:35	29.45	-80.78	28
113086	324	05/24/2011	11:54:36	29.46	-80.79	24
113087	324	05/24/2011	12:04:02	29.46	-80.79	23
113088	324	05/24/2011	12:07:58	29.46	-80.79	26
113089	324	05/24/2011	12:14:31	29.46	-80.79	21
113090	324	05/24/2011	12:22:58	29.46	-80.79	27
113091	298	05/24/2011	12:36:30	29.46	-80.78	23
113092	324	05/24/2011	15:03:30	29.50	-80.81	20
113093	324	05/24/2011	15:07:58	29.50	-80.82	21
113094	324	05/24/2011	15:17:13	29.50	-80.82	22
113095	324	05/24/2011	15:27:21	29.49	-80.82	19
113096	324	05/24/2011	15:32:22	29.50	-80.83	21
113097	324	05/24/2011	15:38:49	29.50	-80.83	19
113098	298	05/24/2011	16:00:52	29.50	-80.81	19
113099	324	05/25/2011	11:53:39	29.31	-80.39	31
113100	324	05/25/2011	12:00:43	29.31	-80.39	34
113101	324	05/25/2011	12:06:42	29.30	-80.39	31
113102	324	05/25/2011	12:15:00	29.30	-80.39	34
113103	324	05/25/2011	12:19:38	29.30	-80.39	31
113104	324	05/25/2011	12:25:42	29.30	-80.38	33
113105	298	05/25/2011	12:38:14	29.31	-80.39	32
113106	324	05/25/2011	15:03:00	29.32	-80.40	31
113107	324	05/25/2011	15:10:07	29.32	-80.40	33
113108	324	05/25/2011	15:17:48	29.32	-80.40	32
113109	324	05/25/2011	15:22:55	29.32	-80.40	33
113110	324	05/25/2011	15:29:49	29.32	-80.41	31
113111	324	05/25/2011	15:35:57	29.33	-80.41	31
113112	298	05/25/2011	16:14:38	29.32	-80.41	32
113113	324	05/25/2011	18:43:03	29.32	-80.51	32
113114	324	05/25/2011	18:48:24	29.32	-80.51	34
113115	324	05/25/2011	18:53:48	29.32	-80.51	31
113116	324	05/25/2011	18:59:51	29.32	-80.51	34

Collection Number	Gear	Date	Time (UTC)	Latitude	Longitude	Depth (m)
113117	298	05/25/2011	19:17:06	29.33	-80.52	33
113118	324	05/26/2011	11:49:28	29.53	-80.42	39
113119	324	05/26/2011	11:57:23	29.53	-80.42	40
113120	324	05/26/2011	12:04:30	29.53	-80.42	38
113121	324	05/26/2011	12:12:37	29.54	-80.42	40
113122	324	05/26/2011	12:17:40	29.54	-80.42	38
113123	324	05/26/2011	12:25:49	29.54	-80.43	38
113124	298	05/26/2011	12:38:41	29.53	-80.42	39
113125	324	05/26/2011	14:35:11	29.54	-80.39	43
113126	324	05/26/2011	14:42:03	29.54	-80.39	42
113127	324	05/26/2011	14:52:00	29.54	-80.39	43
113128	324	05/26/2011	15:00:58	29.54	-80.39	42
113129	324	05/26/2011	15:09:31	29.55	-80.39	45
113130	324	05/26/2011	15:15:33	29.55	-80.39	43
113131	298	05/26/2011	15:42:39	29.53	-80.38	44
113132	324	05/26/2011	17:45:35	29.57	-80.39	42
113133	324	05/26/2011	17:50:54	29.56	-80.39	38
113134	324	05/26/2011	17:55:34	29.56	-80.39	44
113135	324	05/26/2011	18:01:51	29.56	-80.39	42
113136	324	05/26/2011	18:06:53	29.56	-80.39	42
113137	324	05/26/2011	18:11:46	29.55	-80.39	43
113138	298	05/26/2011	18:33:29	29.57	-80.40	42
113139	324	05/27/2011	12:02:43	29.94	-80.29	54
113140	324	05/27/2011	12:09:35	29.94	-80.30	55
113141	324	05/27/2011	12:14:27	29.94	-80.30	54
113142	324	05/27/2011	12:21:47	29.93	-80.29	58
113143	324	05/27/2011	12:25:08	29.93	-80.30	54
113144	324	05/27/2011	12:30:03	29.93	-80.30	54
113145	298	05/27/2011	12:44:57	29.94	-80.29	55
113146	324	05/27/2011	15:09:59	29.95	-80.29	54
113147	324	05/27/2011	15:15:38	29.95	-80.30	53
113148	324	05/27/2011	15:27:27	29.95	-80.30	52
113149	324	05/27/2011	15:30:01	29.95	-80.30	54
113150	324	05/27/2011	15:37:40	29.94	-80.31	54
113151	324	05/27/2011	15:45:54	29.94	-80.31	55
113152	298	05/27/2011	16:18:50	29.95	-80.29	56

Figure 1. Chevron trap with video cameras attached over the nose and mouth positions.

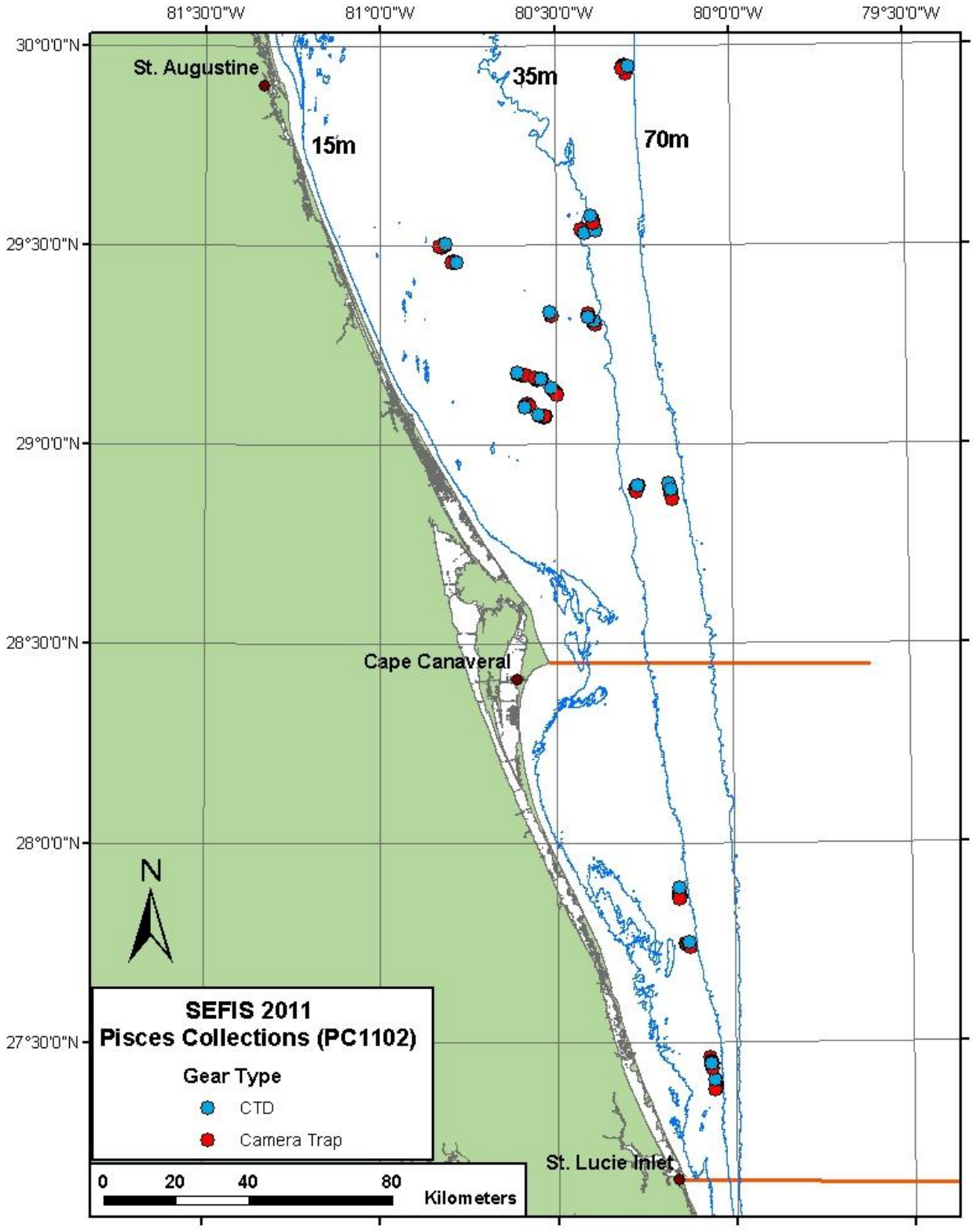

Figure 2. Locations of stations sampled with camera-trap and CTD gear on the PC-11-02 survey. Note that symbols overlap in many cases.

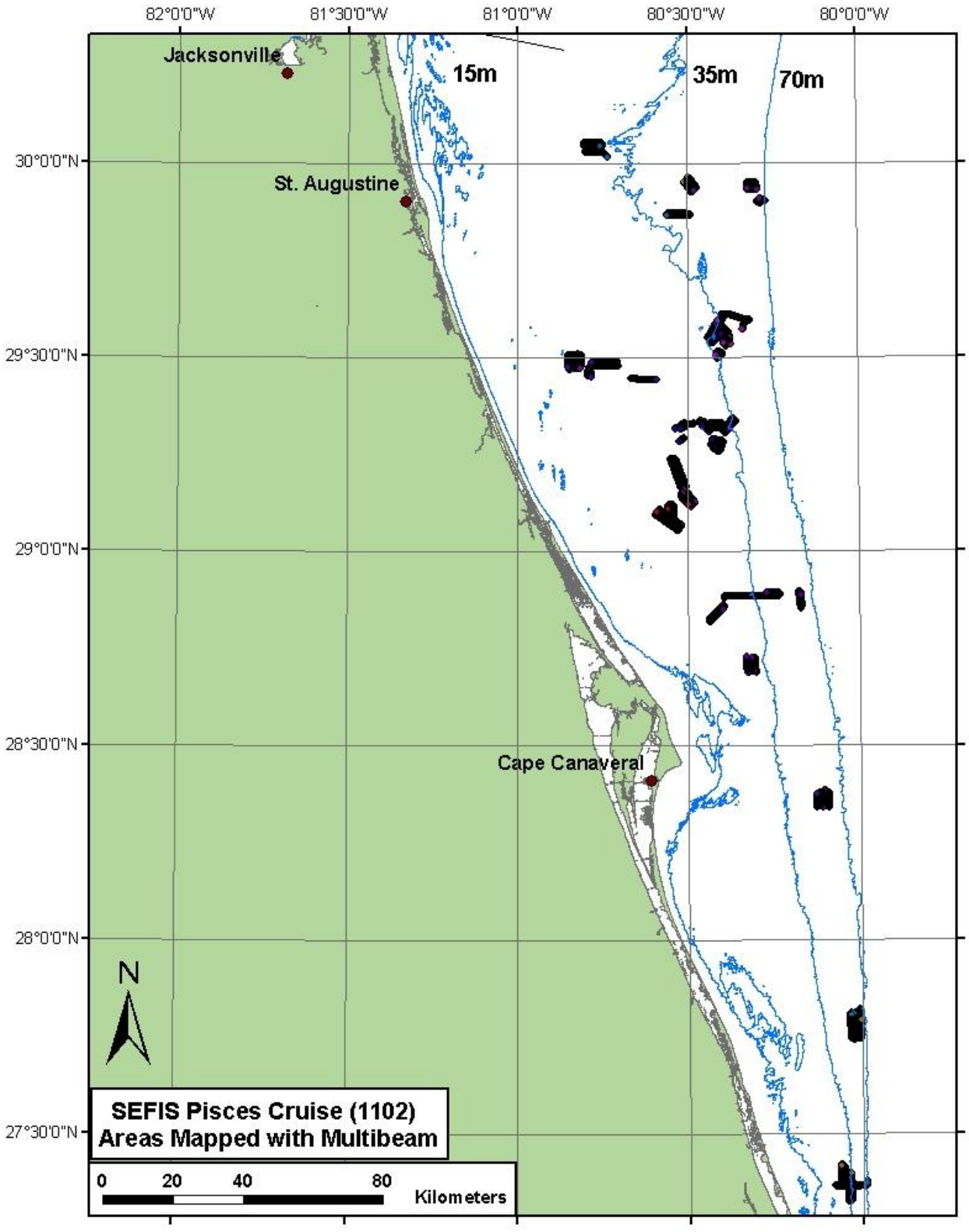

Figure 3. Locations mapped with multibeam acoustic gear on the PC-11-02 survey.

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